

Effect of an in-situ thermal annealing on the structural properties of self-assembled GaSb/GaAs quantum dots

ABSTRACT

In this work, the effect of the application of a thermal annealing on the structural properties of GaSb/GaAs quantum dots (QDs)¹ is analyzed by aberration corrected high-angle annular dark-field scanning transmission electron microscopy (HAADF-STEM)² and electron energy loss spectroscopy (EELS)³. Our results show that the GaSb/GaAs QDs are more elongated after the annealing, and that the interfaces are less abrupt due to the Sb diffusion. We have also found a strong reduction in the misfit dislocation density with the annealing. The analysis by EELS of a threading dislocation has shown that the dislocation core is rich in Sb. In addition, the region of the GaAs substrate delimited by the threading dislocation is shown to be Sb-rich as well. An enhanced diffusion of Sb due to a mechanism assisted by the dislocation movement is discussed.

Keyword: GaSb; Quantum dot; Scanning transmission electron microscopy; Thermal annealing